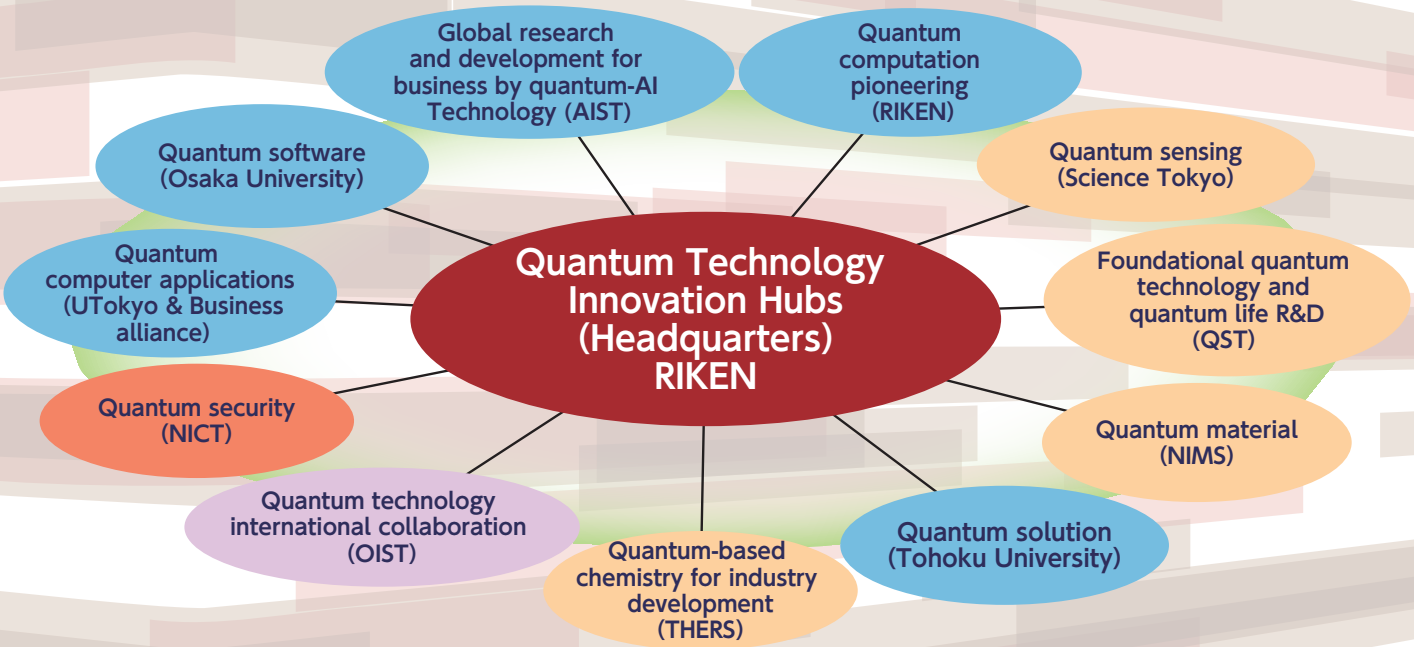
QIH
Quantum Innovation Hubs

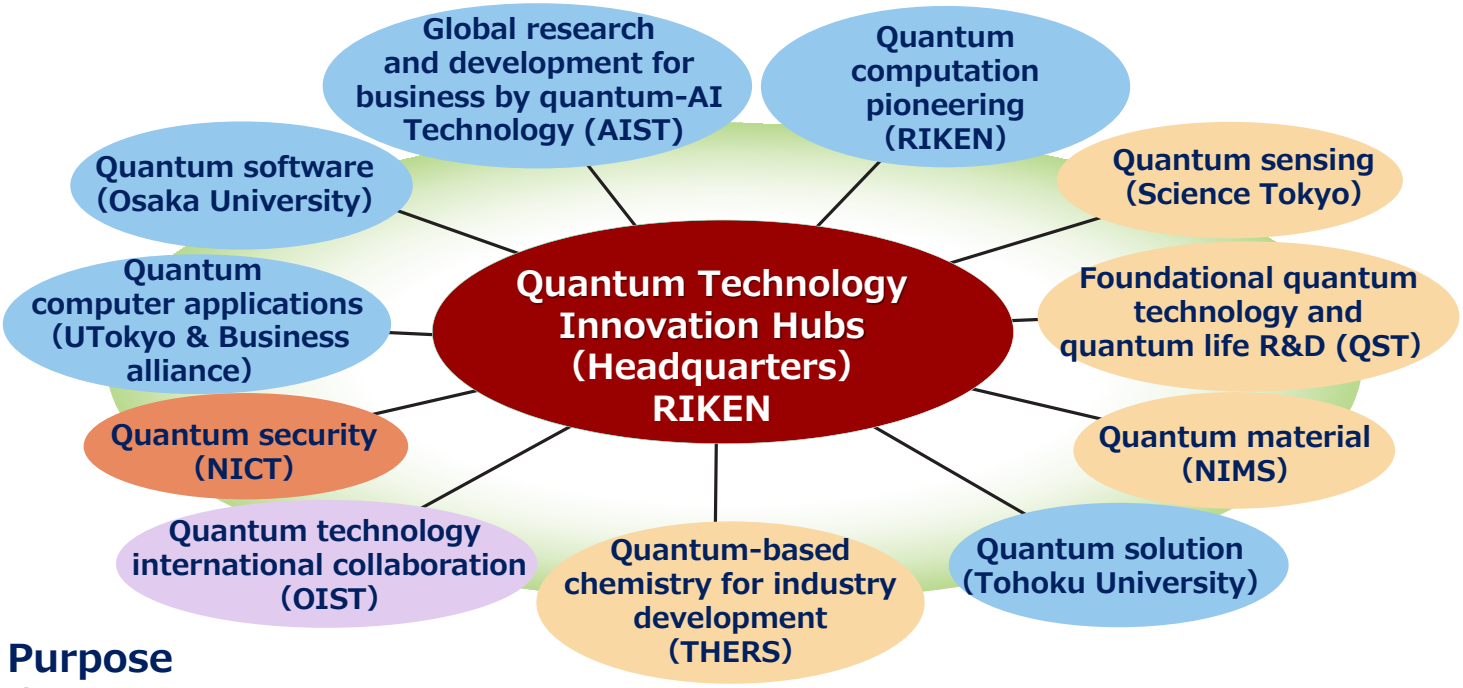
Quantum Technology Innovation Hubs



Quantum Technology Innovation Hubs

QIH Quantum Innovation Hubs

○ **Eleven Quantum Technology Innovation hubs** have been established based on successive quantum strategies of Japanese Government.
○ **RIKEN has a headquaters function** in order to support cross-hub activities among the quantum innovation hubs.



Purpose

○ Through the Quantum Technology Innovation Promotion Committee, which consists of the heads of the hubs, the hubs promote proposals and measures to solve their common issues.
○ All the hubs share their strategies, and they are committed to build an ecosystem to implement quantum technologies into the society.
○Publicity in Quantum Technologies. Q-Portal

Activities

Each hub cooperates with one another in the four subcommittees under the Quantum Technology Innovation Promotion Committee.

① **International Collaboration Subcommittee:** promoting international alliances, such as international symposia and joint researches.
② **Intellectual Property/Standardization Subcommittee:** sharing the strategies on intellectual properties and international standardization.
③ **Industry-Government-Academia collaboration Subcommittee:** promoting to implement quantum technologies into the society under the collaboration with industry, government, and academia.
④ **Human Resource Development Subcommittee:** promoting participation of young researchers into quantum fields, and strengthening inter-disciplinary and inter-organizational human resource development.

The international symposium on Quantum Science, Technology and Innovation 2024

Summer School 2024@Chiba

Quantum Computation Pioneering（RIKEN）

1． Mission

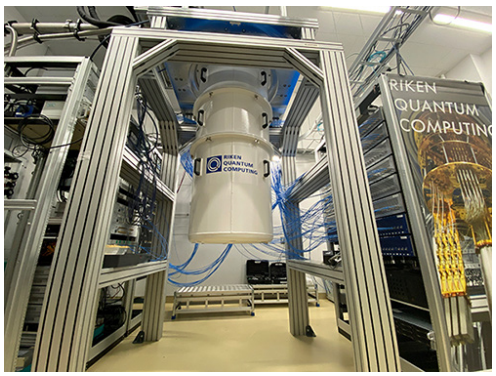
○ To realize quantum computers by bringing together the quantum and computer science and technology in RIKEN.

○ To play the role of headquarters of the Quantum Technology Innovation Hubs in order to contribute the improvement of quantum technologies in Japan.

2． Activities

① <u>Superconducting quantum computers</u>
developed an original 64-qubit full-stack quantum computer.

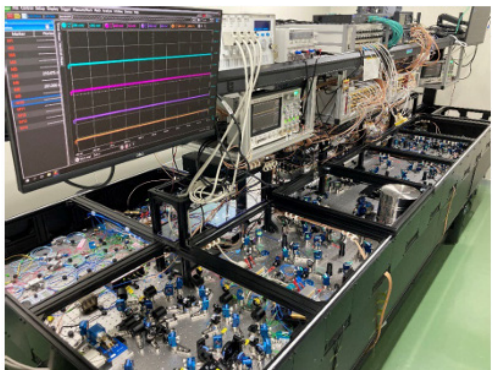
- developed 64-Qubit quantum computer “A” and made it into a cloud service.
- Fujitsu has started operation of the 2nd quantum computer, which was developed based on the technology of “A”.
- Osaka University also has started a cloud service, where the RIKEN 64-qubit chip is used.



64-qubit quantum computer “A”

② <u>Optical quantum computers</u>
Succeeded development of an optical quantum computer

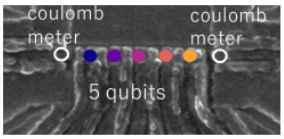
- developed an optical quantum computer which can calculate linear algebra operations for continuous variables in 100MHz system clock.
- for applied research, provided a quantum computer platform consisting of a cloud system and a software development kit.



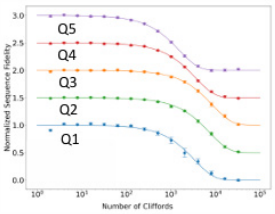
Optical quantum computer

③ <u>Semiconductor qubits</u>
implemented high-fidelity silicon 5 qubits

- achieved world’s highest fidelity (>99.99%) of 5 qubits by decreasing errors in gate operations in the quantum device. (conventional >99.9%)



Si/SiGe

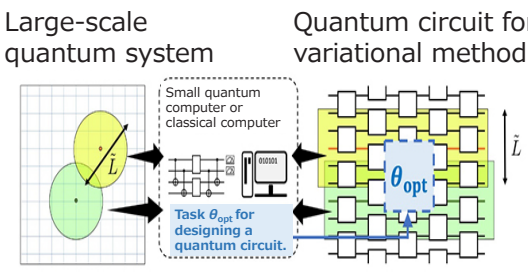


	Primitive Gate Fidelity
Q1	99.996(2) %
Q2	99.998(1) %
Q3	99.998(1) %
Q4	99.996(1) %
Q5	99.990(1) %

Silicon 5-qubit device and their fidelities

④ <u>Quantum computation theory and software</u>
developed design method of a quantum circuit for the simulation of large-scale quantum system

- developed a general-purpose and practical method so that a quantum computer can efficiently simulate a large-scale quantum system in a compact quantum program.
- It can calculate the dynamics of a quantum system with 100 times more precision than before.



Proposed method

Quantum Sensor Hub（Science Tokyo）

1． Mission

At the quantum sensor hub, our goal is to implement societal applications of quantum and quasi-quantum sensors by leveraging solid-state, atomic, ionic, and nano-particle technologies that notably outperform classical sensors.

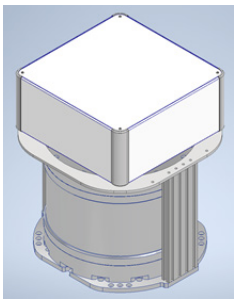
2． Activities

Quantum Inertial Sensors

Development of ultra-high-precision inertial navigation devices using quantum and quasi-quantum inertial sensors. Real-time continuous geoid measurement achieved through collaboration with optical lattice clocks and star tracker technology.

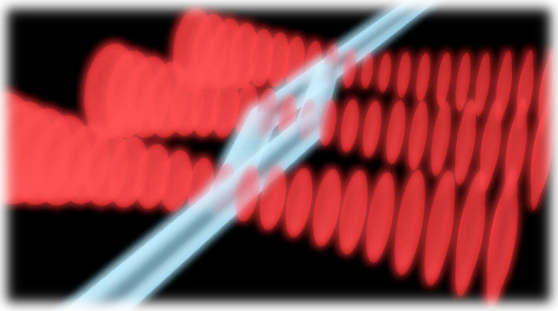
Prototyping an Ultra-Precise Inertial Navigation System

Following an agile V-shaped integration development model utilizing Model-Based Systems Engineering (MBSE), we prototyped an ultra-precise inertial navigation system (INS). By conducting thorough front-loading through Model In the Loop Simulation (MILS) and leveraging Hardware In the Loop Simulation (HILS), we precisely evaluated the performance of each inertial sensor. The navigation accuracy of the prototype demonstrated performance far superior to domestic high-end INS in both fixed-point experiments and automobile driving tests.



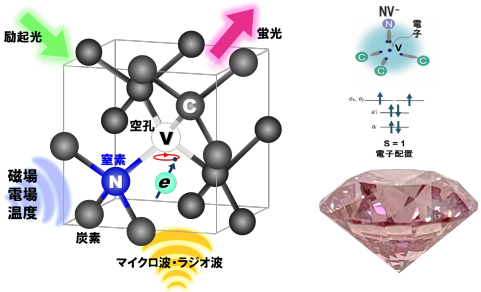
Started prototyping a compact portable snsor

Based on the operating principles of vehicle motion-resistant quantum gyroscope developed and validated at the Quantum Sensor Hub, we are designing and prototyping a compact portable quantum gyroscope. Next year, we plan to begin verification using HILS, which was also developed at the Quantum Sensor Hub.



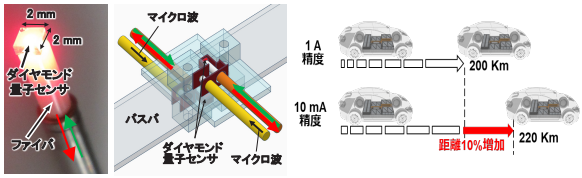
Diamond Quantum Sensors

Innovation creation through the development of ultra-sensitive quantum sensors using nitrogen-vacancy (NV) defects in diamond for detecting magnetic fields, temperature, electric fields, and more.



Measurement applications for batteries and power devices

Developed a diamond quantum sensor with an accuracy of 10 mA within a current range of ±1,000 A to maximize the utilization efficiency of batteries for electric vehicles (EVs). Verified a charging and discharging measurement accuracy of 0.1% in standard driving modes.

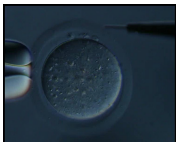


Y. Hatano et al., Sci. Reports (2022)、 Photograph of diamond quantum sensor (left), battery current measurement setup (center), and expected EV driving range extension by improving sensor accuracy (right)

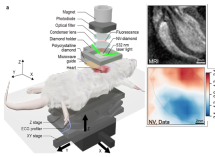
Scalable applications for biometric

Demonstrated temperature measurement at arbitrary locations within cells (sensitivity <0.2° C) and small animal magnetocardiography with millimeter resolution. Currently working on enhancing sensitivity for human brain magnetoencephalography (MEG). The highest sensitivity of 9.4 pT/√Hz was achieved in CW measurement*.

*N. Sekiguchi, et.al.,PHYSICAL REVIEW APPLIED 21, 064010 (2024)



Unfertilized mouse oocyte and probe-type diamond sensor (top right)



K. Arai et al., Comm. Physics(2022) Magnetocardiography and magnetic field/current mapping in rats

Image of human magnetoencephalography sensor

Foundational Quantum Technology and Quantum Life R&D Hubs (QST)

National Institutes for Quantum Science and Technology

1. Mission

Strengthen QST's R&D infrastructure, play a central role in the R&D for and supply of key materials for quantum devices, and take the lead in the R&D for and application of quantum life technologies as the integration of quantum technology with life science and medicine.

2. Activities

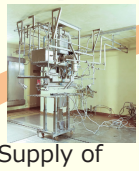
Through the application of quantum technology to medicine and industry, we contribute to the resilience and sustainability of a diverse society where the safety and well-being of all is ensured.

Establish testbed environments to accelerate the use in wide range of fields, promote the applications, industrialization and human resource development through industry-academia collaboration

Foundational Quantum Technology

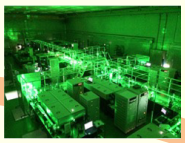
Based on materials science, spintronics, photonics, electronics, quantum beam and other technology, this hub develops and supplies quantum materials that demonstrate advanced quantum functions.

Takasaki Institute for Advanced Quantum Science (Takasaki, Gunma)



- Development and Supply of Advanced Quantum Materials
- Construction and Operation of Open Platform for Industry

Kansai Institute for Photon Science (Kizugawa, Kyoto)



- Development and Application of Spin Control Technology using Advanced Lasers

Satellite Labs.

Institute of SCIENCE TOKYO Meguro-Lab.:

東北大学 TOHOKU UNIVERSITY Sendai-Lab. :

- Construction and Operation of Open Platform for Industry

SPring-8 (Sayo, Hyogo) NanoTerasu (Sendai, Miyagi)

- Advanced Evaluation of Quantum Materials and Devices

Quantum Life R&D

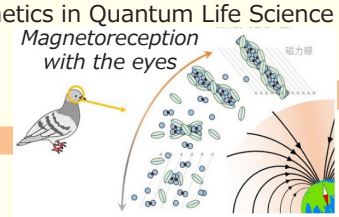
This hub develops cutting-edge base technologies for life science and medicine, such as quantum biosensors, and provides animal experiment facilities where they can be used.

- Development and Application of
  - Nanoscale Quantum Biosensors
  - Hyperpolarized MRI/NMR
- Elucidation and Biomimetics in Quantum Life Science

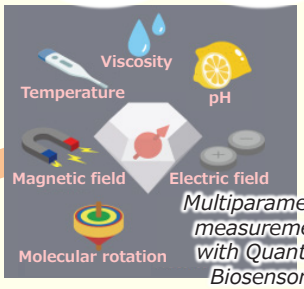
Institute for Quantum Life Science (Chiba City, Chiba)

Test Bed Equipment
- ODMR Microscopes: 9 units
- Hyperpolarized MRI/NMR: 6 units
- Advanced Spectroscopy Equipment: 3 units

Neutron Facilities for Life Science (Tokai, Ibaraki)



Open Platform **Open Innovation**



Support Programs for Industry

We provide education, consultation, and environment for trials on quantum technologies through a one-stop support office in QST.

User

One-stop Support Office (QST)

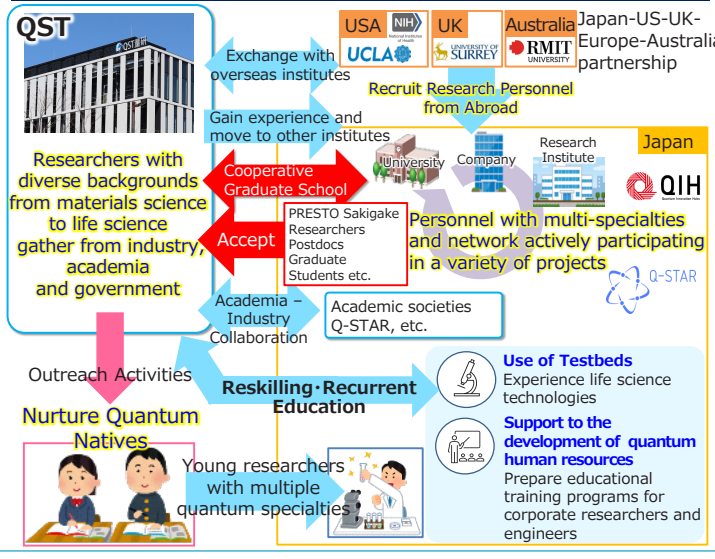
① Technical Consulting
A quantum technology advisor will respond to your questions and consultations.

② Trial by Testbed
We prepare testbeds where you can actually experience measurements using solid-state quantum sensors.

③ Education
We have educational training programs for corporate researchers, engineers, and young scientists.

④ Consulting for Collaboration
We will respond to consultations regarding NDA, research collaboration, patent application, etc.

Human Resources Development



Quantum material（NIMS）

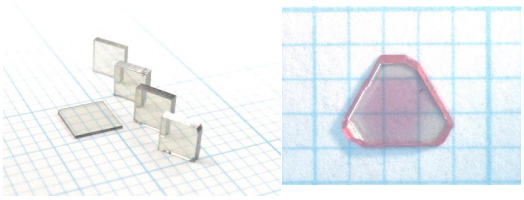
1． Missions

○ Developments of quantum materials research and establishment of a research center in NIMS for quantum materials and technology innovation.

○ R&D of quantum materials for sensors and telecommunication by thin film and bulk single crystal growth technologies of NIMS in collaboration with universities and other research institutes.

2． Activities

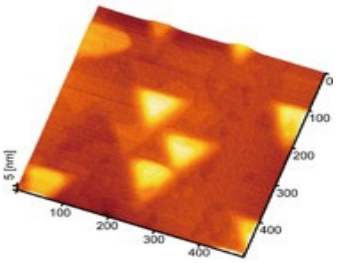
Research and development focused on the following themes from 2020.



(left) N-doped CVD diamond single crystals. (right) Red fluorescing HPHT single crystal diamond.

① Quantum Magnetic Sensing

- Increase of sensitivity by optimizing diamond NV center density and their spin coherence time.
- Single diamond NV center in nanometer depth.
- Decoherence mechanism of electron spins.
- Search for novel color centers in ultra-wide-gap materials.



Nanoscale semiconducting quantum dots.

② Quantum Light Source

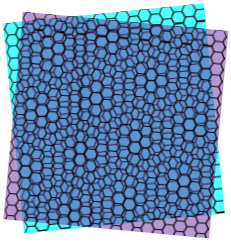
- Synthesis of quantum dots for telecommunication.
- High temperature operation of photon source by band-gap engineering.
- High power light source devices.

③ Innovative Photonic Functions

- Novel topological photonic quantum materials.
- Novel functions by light-matter interaction.
- Basic technology for innovative semiconductor topological photonics.

④ Basic Research for Quantum Technology Innovation

- Emergent quantum fuctionalities in structural controlled atomic layer materials.
- Novel topological quantum bit materials.
- Quantum-enhanced magnetic memory and sensor.
- High-quality single-crystals topological materials.



2D moiré superlattice.

Quantum solution （Tohoku University）

1． Mission

○Providing valuable "human resources" and "solutions" from quantum computing to industry

○ In collaboration with many user and vendor companies, support for the utilization of quantum computers, construction of a quantum/classical hybrid computing environment, and industrial human resource development through these activities, **forming a center that supports the utilization of quantum technology, research and development of solutions that are valuable to industry, and industrial human resource development.**

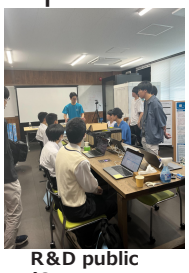
2． Activities

① Quantum Product Commercialization Promotion Platform Construction Project (BRIDGE)

・R&D, education, and support activities to develop human resources and establish startups to realize the vision of a quantum future society, which aims to build startup technology infrastructure using quantum computers.

[Ex.]
・Two quantum product development organizational bases (Tohoku University T-QARD, Tokyo University of Science IScT-QARD)
・Public research and development events in conjunction with open campus events
・Quantum app development camp in conjunction with university intensive lectures_business hackathon with local companies
・Overseas local workshops co-hosted with QA4U3 (planned: JICA, Taiwan)

Quantum App Development Camp (Quantum Camp in Okinawa)



R&D public event(Open campus at the same time)

② Research and development platform for co-creating new businesses using quantum computers(SIP3rd : Innovation creation platform)

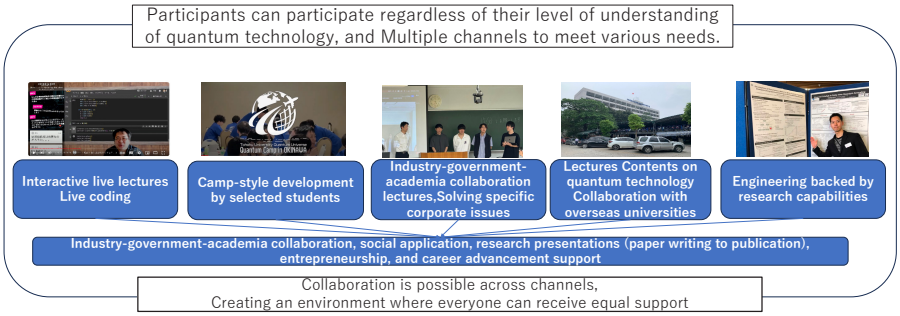
・Educational programs aimed for commercialization that will contribute to building the foundation for startup creation, and quantum solution development events with local companies and local governments in each region.

[Ex.]
・Open lecture series QX4U (QA4U/QC4U/QI4U)
・Practical quantum solution creation theory (university-wide lecture)
・T-QARD Lab (INDEST Tamachi)
・T-QARD open workshop (Kumamoto University, Fukuoka University, University of Science)
・Collaboration agreement with Kumamoto University and quantum hub formation

Open Lecture Series: QX4U(QA4U/QC4U/QI4U)

Practical Quantum Solution Creation Theory

QA4U3(2025/1/31-)



③ Collaboration with companies, Co-creation Research Center, Joint Research Chair for Quantum Computing

・Composition of a cross-disciplinary research institute in the form of research support by private companies. Regular research meetings (technical lectures) and information exchange activities, Jointly disseminating information at exhibitions, etc.
[Participants] KYOCERA, NECSI, Sigma-I, Sumitomo Corp., SCSK, LG Japan Lab, MITSUBISHI ELECTRIC・CHODAI

Quantum-Based Frontier Research Hub for Industry Development (Q-BReD)

---Tokai National Higher Education and Research System---

QIH Quantum Innovation Hubs

1. Mission

○We will explore the frontiers of quantum-based technology and industry by integrating different research fields such as medicine, chemistry, materials, and informatics.

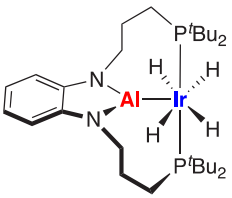
○In particular, we aim to develop a new quantum industry, focusing on quantum and chemistry.

2. Activities

①Base metal- and multimetallic-catalysts

We develop base metal catalysts and multimetallic catalysts that lead to stable supply.

- New base metal catalysts
- Multimetallic catalysts
- Precise orientation of atoms or molecules



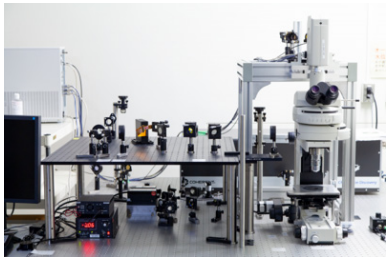
Multimetallic catalyst

Luminescence properties of multielement QDs

② Luminescent probes using multiple elements

We develop lightfastness dyes and next-generation quantum dots (QDs) using multiple elements.

- New fluorophores showing lightfastness
- Next-generation QDs with low toxicity
- Control of optical properties using multi-element QDs

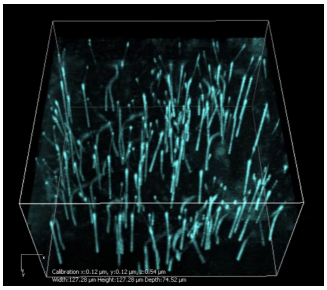


Holographic microscopy

③ New techniques for bioimaging

Development of new methods for non-invasive biological imaging.

- *In vivo* application of quantum-based materials
- Simultaneous detection of fluorescence and MR
- Improving the performance of holographic microscopy

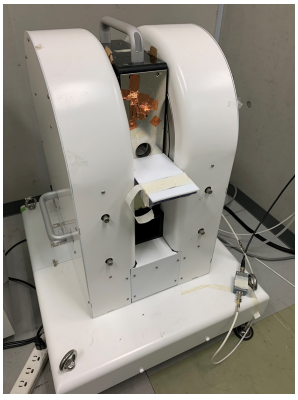


Defect analysis of semiconductor materials by multiphoton microscopy

④ Next-generation MRI technology

Hyperpolarized MR imaging for visualizing *in-vivo* functions and metabolism.

- Dissolution Dynamic Nuclear Polarization (DNP)
- *In vivo* DNP
- Development of *in vivo* DNP MRI machine



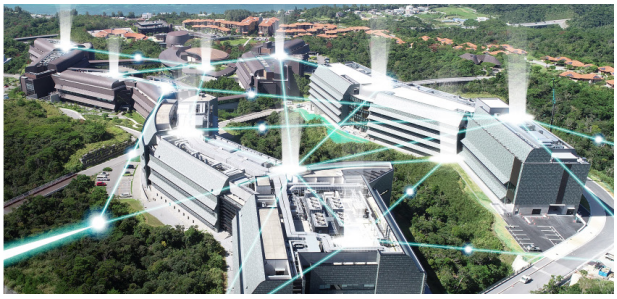
***In vivo* DNP**

Quantum Technology International Collaboration Hub
（Okinawa Institute of Science and Technology (OIST) ）

1． Mission

○ Promote cutting-edge research and development in quantum technology through international collaboration.

○ Provide education for researchers and next generation leaders through research and development in an international environment and contribute to the medium-to-long-term development of quantum technologies.



2． Activities

From Okinawa to the World: contributing by creating new innovative technologies.

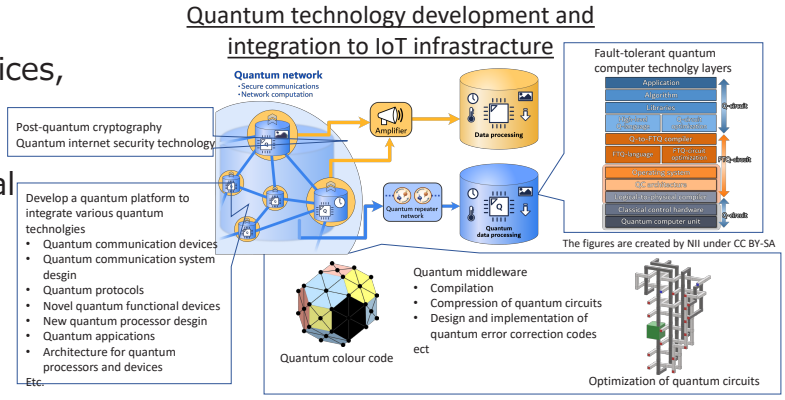
OIST | Quantum

The OIST Center for Quantum Technologies was established in October 2022. This center functions as a core for the various activities associated with cutting-edge international research and human resource development, as well as industry-academia collaboration. We aim to develop quantum technologies from basic research to their social implementation and educate highly skilled human resources through conducting the cutting-edge research.

① Research Projects

From fundamental to applied and integrated research to maximize the impact of quantum technology in our society.

- Quantum computation technologies: quantum algorithms, applications, devices, architectures & machine learning.
- Internet of Quantum Things (IoQT)
- Quantum sensing & quantum functional devices: design and realization
- Cryptography technology and security for the future quantum society



② Global Collaboration

Strengthen our innovative international research environment with diverse expertise

- International conferences, workshops and summer schools to promote innovative developments in quantum science & technology through gathering excellent researchers with various backgrounds from Japan and world-wide

③ Human resource development with Industry

Human resource deveopment for quantum technologies funded by SIP 3rd program (from November 2023 to March 2028)

- Quantum literacy program (in Tokyo)
- Research Tech program (for the corporate workforce)
- Global-leadership program

We promote quantum literacy in the wide industrial workforce landscape and integrate quantum skills & knowledge to their existing technological basis. A key focus is on developing next generation leaders.

Certificate of Completion for the Quantum literacy program

Quantum security (NICT)

QIH Quantum Innovation Hubs

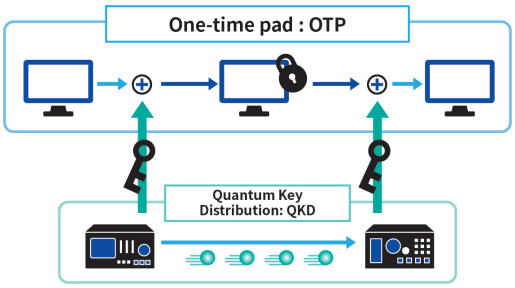
1. Our missions

○ Creation of quantum security

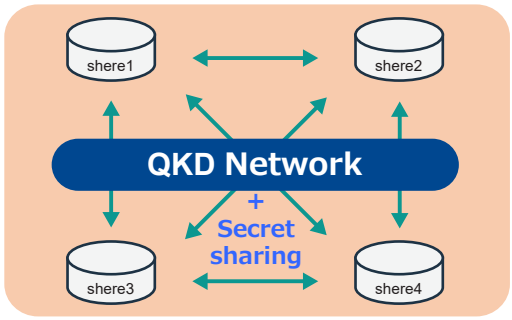
Modern cryptography may be easily decrypted with new computing technology. Therefore, we research and develop “Quantum cryptography“, which can’t be decrypted by any computer.

We work on developing a new fusion field called "Quantum security field", which combines Quantum ICT field with peripheral technologies.

For example, we developed "Quantum secure cloud", a combination of quantum cryptography and secret sharing. We conduct experiments on this with companies that handle important information.



Quantum cryptography



Quantum secure cloud

Monitor of Tokyo QKD Network

2. Objectives

① Industry-Academia-Government collaboration

We establish an environment for industry, academia and government to collaborate in quantum cryptography and satellite quantum communications.

- Extending Tokyo QKD Network
- Using Tokyo QKD Network as open testbeds

② Human resources development

We provide practical programs to train future Quantum ICT human resources.

- NICT Quantum Camp
- Young Researchers Lab
- Internships for students and graduated people

③ Dissemination to society

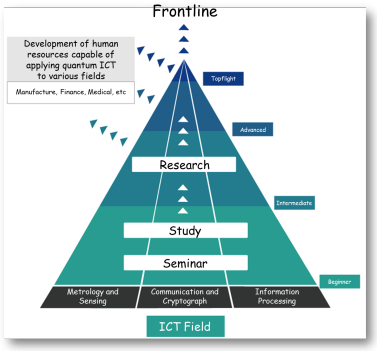
We work on standardization and establishment of evaluation/certification scheme for earlier dissemination of quantum security.

- Standard documents of QKDN and QKD modules
- Evaluation/certification systems for QKD

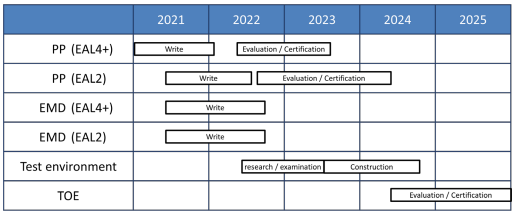
④ Outreach activities

We continue publicizing our missions and achievements through organizing events and participating in exhibitions.

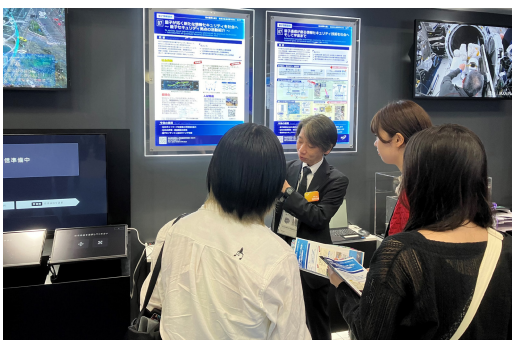
- NICT OPEN HOUSE 2024
- CEATEC 2024



Structure of training



Standardization schedule



CEATEC 2024

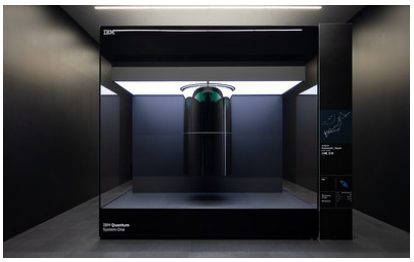
Quantum computer applications (UTokyo & Business alliance)

1. Mission

○ Realize the world's first social implementation of a quantum computer by promoting technical cooperation and close mutual exchange of information among industry, government, and academia to boost development in Japan as a whole and accelerate the realization of quantum computing technology

○ Build a quantum ecosystem using commercial quantum computers from IBM

Image Source：IBM Japan



IBM Quantum System One

2. Activities

(1) Quantum Innovation Initiative (QII) Consortium

Conduct industry-academic joint research using IBM® Quantum System One*

*Japan's first gated commercial quantum computing system is installed and operated by IBM at the Kawasaki Business Incubation Center (KBIC) and is owned by the University of Tokyo (access was provided to regular members of the Consortium from July 2021).

Accelerate research by sharing the latest R&D trends and research results on quantum technology from researchers at universities and companies

Image Source：Quantum Innovation Initiative (QII) Consortium HP

QII Consortium Members

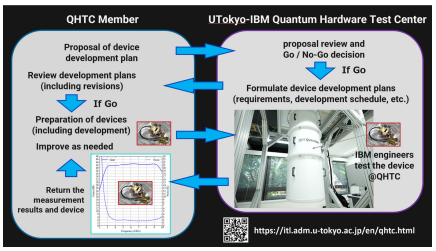
QHTC Members

(2) IBM - UTokyo lab.

Establishment of the University of Tokyo - IBM Quantum Hardware Test Center(QHTC)

→Promotion of testing and research on quantum computer components through the Quantum System Testbed

- Advanced cryogenic microwave components and subsystems
- Control electronics
- High-frequency components and wiring required for high-quality signal transmission, etc.



Device Development Process @QHTC

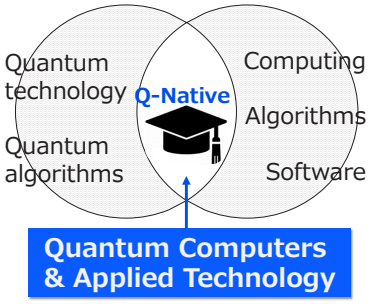
Implementation of collaborative research

Researchers from the University of Tokyo and IBM develop software applications and hardware related to quantum computing

(3) Quantum Native Education Center

Implementation of an educational program through practical training on actual quantum computer equipment with the aim of fostering quantum natives

- 1st and 2nd year undergraduates: Advanced education for selected personnel (Advanced Science Course)
- 3rd and 4th year undergraduates: Development of interdisciplinary and international human resources
- Graduate School: Cutting-edge education and research



Q-Native Training Program

(4) Quantum Initiative

Visualization and dissemination of various educational and research projects in quantum-related research areas at the University of Tokyo

→67 projects listed (as of December 1, 2024)

(5) Center of Innovation for Sustainable Quantum AI (SQAI)

Cooperation with the COI-NEXT Center for Sustainable AI Research through Co-creation of Quantum Software and HPC/Simulation Technologies: in regard to research and development of quantum machine learning, quantum simulation, etc.

→44 institutions participating in SQAI (as of December 2024)

Quantum & AI Experiential Learning

Quantum Software Research Hub (Osaka University)

QIH Quantum Innovation Hubs

1. Mission

The Quantum Software Research Hub aims to contribute to the social implementation of quantum computers by developing algorithms for fault-tolerant universal quantum computers, through the hybrid utilization of NISQ machines and classical computers, and by creating applications in a wide range of fields such as quantum AI and quantum chemistry.

QIQB

Center for Quantum Information and Quantum Biology

2. Activities

① Quantum Software Research and Development

MEXT - Quantum Leap Flagship Program (MEXT Q-LEAP), Technology Area: Quantum information technology

Development of quantum software by intelligent quantum system design and its applications

- Establishing the foundational theories of quantum computation and quantum AI (QAI)
- Identifying problems in finance and/or quantum chemistry, where there is expected to be a quantum advantage
- Applying QAI as a tool to chemistry and material science, and developing the research field of quantum × informatics
- Designing middleware to improve the performance of quantum computers
- Applying existing noisy-intermediate scale quantum (NISQ) computers to practical problems

[Agency] Osaka Univ., Kyoto Univ., U Tokyo, NICT etc.

←*Search here*

MEXT Q-LEAP
QuAI flagship

② Formation of Open-Platform Research Centers

Funded by Japan Science and Technology Agency (JST) through "The program on open innovation platform for industry-academia co-creation (COI-NEXT)"

Creating a sustainable future society by building a quantum software development platform, promoting social implementation and dissemination, as well as establishing a platform for solving social problems.

- Develop a library for science and technology calculations such as machine learning and quantum chemistry
- Create the cloud environment and underpinning software for performing quantum computation
- Build test bed environments and control of quantum computer hardware

[Agency] Osaka Univ., Kyoto Univ., RIKEN, Fujitsu Limited, AWS and about 40 companies.

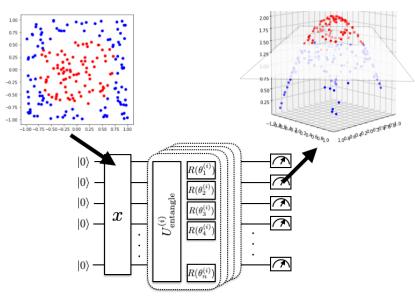
←*Search here*

QSRH
QUANTUM SOFTWARE RESEARCH HUB

←*Search here*

Research

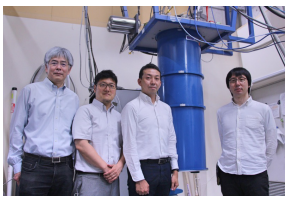
- ✓ Proposed quantum circuit learning algorithm (QCL) (>1500 citations)
- ✓ "Current numbers of qubits and their uses", Nature Reviews Physics **6**, 345-347 (2024)



Quantum machine learning using QCL

Development

- ✓ The first simulator in the world, Qulacs
- ✓ GUI Simulator, Qulacs Simulator
- ✓ Quantum machine learning library
- ✓ Quantum chemistry library
- ✓ Open Quantum Toolchain for OPerators & USers, OQTOPUS
- ✓ QuEL, Received the Minister of Education, Culture, Sports, Science and Technology Award at Award for Academic Startups 2024



Founders of QuEL

Eco-System Building

- ✓ Tours and hands-on experience with quantum computers in collaboration with QunaSys
- ✓ Quantum software information sessions for industry and students
- ✓ Future Forum at Umeda "Quantum Town Edition"
- ✓ Symposium "The Future of Quantum Computing"

Japan's third quantum computer at Osaka University

Global Research and Development Center for Business by Quantum- AI technology (G-QuAT)

(AIST)

Scan for poster

QIH Quantum Innovation Hub

Comprehensive Industrial Support in Quantum Technology

AIST As one of Japan's largest research institutions, AIST tackles social issues and strengthens industrial competitiveness through creation and social implementation of research results. Under the Industrial Competitiveness Enhancement Act, it is the only national research institute that can utilize its facilities and equipment not only for research and development but also for business creation.

G-QuAT Established within AIST in July 2023, with the themes of "business development" and "global," it supports the industrialization of quantum technology in collaboration with domestic and international companies and research institutions. It is highly anticipated by domestic and global companies and startups.

G-QuAT Strategic Activities

1 Global Collaboration

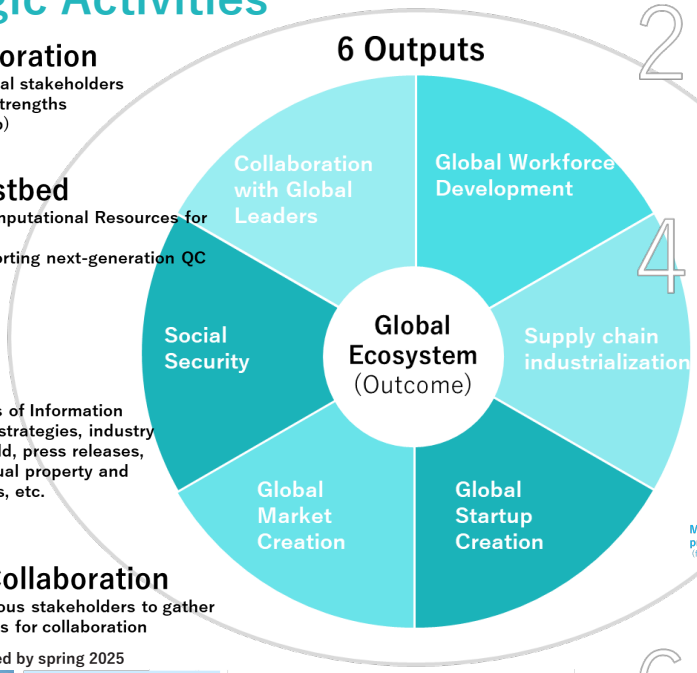
Collaboration with global stakeholders by leveraging Japan's strengths (a win-win relationship)

3 Platform/ Testbed

Quantum Classical Computational Resources for Use Case Creation
Accelerating and supporting next-generation QC development

5 Intelligence Function

Collection and analysis of Information
e.g. Government strategies, industry trends in the world, press releases, articles, intellectual property and investment status, etc.

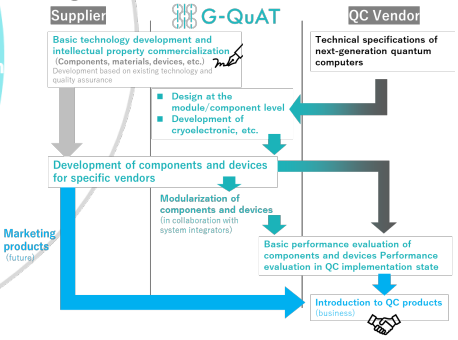


2 Linkage with Government Strategy

Role as an implementation tool for government strategies*, policies and program
*e.g.; Vision of Quantum Future Society Future Society to be Realized through Quantum Technology and Strategies for Its Realization

4 Supply Chain Creation

Joint development of components, etc. for next- generation machines



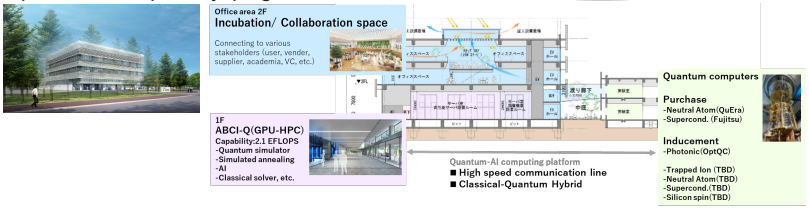
6 IP/ Standardization

Supporting standardization and securing intellectual property for quantum related technologies

7 Incubation/ Collaboration

Provide a place for various stakeholders to gather and create opportunities for collaboration

Expected to be completed by spring 2025



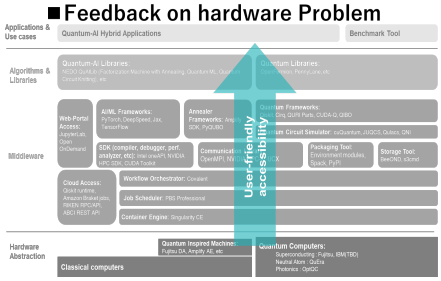
8 Competitive Environment

Provide infrastructure (e.g. facilities, space, investment environment to stakeholders to induce market competition)

G-QuAT Platforms

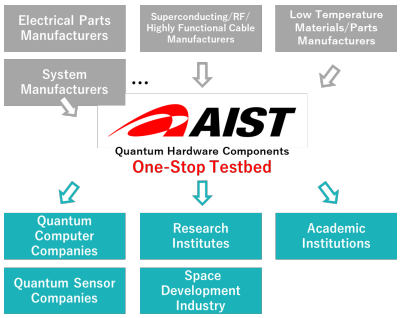
1 Industrial Use-case Creation & Quantum-HPC Computing Platform

- ABCI-Q (NVIDIA H100 x 2020 units) & QCs
- Use of various computing resources
- Feedback on hardware Problem



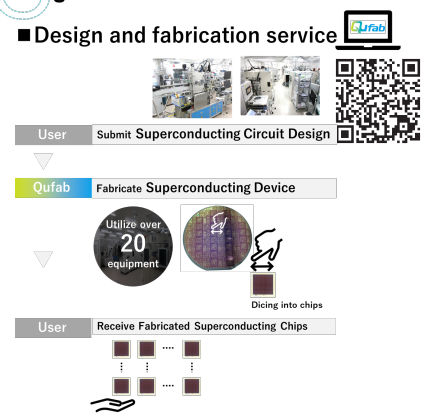
2 Quantum Hardware System & Industry-level Supply Chain Creation

- Testing service and standardization for next generation QC



3 Fabrication Technologies for Large-Scale QC

- Design and fabrication service



Global Research and Development Center for Business by Quantum-AI Technology (G-QuAT), AIST
Contact: M-G-QuAT-plan-ml@aist.go.jp

AIST Create the Future, Collaborate Together

Global Research and Development Center for Business by Quantum-AI Technology

QIH
Quantum Innovation Hubs

Q-Portal

QUANTUM
INNOVATION
2025